

CLAIMS

1. An ultra-small, high-speed 50 ohm coaxial cable comprising:
 - a. a longitudinal conductor having a diameter of 0.008" to 0.0253";
 - b. a support wrap helically wound about the conductor according to a wrap pitch and comprising first and second insulator filaments helically twisted together according to a twist pitch, wherein the filaments each have a diameter of 0.0025" to 0.010" and a tolerance of ± 0.00025 ";
 - c. an insulator sheath at least partially covering the support wrap and the conductor, wherein: the insulator sheath has an inner diameter of 0.020" to 0.075" and an inner diameter tolerance of ± 0.0005 "; the insulator sheath has a wall thickness, and a wall thickness tolerance of ± 0.00025 "; and the insulator sheath is supported by the support wrap at a particular number of support locations and is thereby offset from the conductor to form an airspace between the conductor and the insulator sheath;
 - d. a concentric ground shield disposed about an outer periphery of the insulator sheath; and
 - e. a concentric outer insulator jacket disposed about an outer periphery of the concentric ground shield, wherein:
 - f. the cable has a characteristic impedance tolerance of ± 1 ohm.
2. The coaxial cable of Claim 1 wherein the cable has a propagation speed of no more than 1.14 ns/ft nominal, a propagation speed tolerance of ± 0.01 ns/ft, and a capacitance of no more than 22.5 pF/ft nominal.
3. The cable of Claim 1 wherein the insulator sheath wall thickness is 0.005 ± 0.00025 ".

4. An ultra-small, high-speed 75 ohm coaxial cable comprising:
 - a. a longitudinal conductor having a diameter of 0.0063" to 0.0508";
 - b. a support wrap helically wound about the conductor according to a wrap pitch and comprising first and second insulator filaments helically twisted together according to a twist pitch, wherein the filaments each have a diameter of 0.003" to 0.025" and a tolerance of ± 0.0025 ";
 - c. an insulator sheath at least partially covering the support wrap and the conductor, wherein: the insulator sheath has an inner diameter of 0.030" to 0.200" and an inner diameter tolerance of ± 0.0005 "; the insulator sheath has a wall thickness, and a wall thickness tolerance of ± 0.00025 "; and the insulator sheath is supported by the support wrap at a particular number of support locations and is thereby offset from the conductor to form an airspace between the conductor and the insulator sheath;
 - d. a concentric ground shield disposed about an outer periphery of the insulator sheath; and
 - e. a concentric outer insulator jacket disposed about an outer periphery of the concentric ground shield, wherein:
 - f. the cable has a characteristic impedance tolerance of ± 3 ohm.
5. The coaxial cable of Claim 4 wherein the cable has a propagation speed of no more than 1.14 ns/ft nominal, a propagation speed tolerance of ± 0.01 ns/ft, and a capacitance of no more than 15.0 pF/ft nominal.
6. The cable of Claim 4 wherein the insulator sheath wall thickness is 0.005" \pm 0.00025".
7. An ultra-small, high-speed cable comprising:
 - a. a longitudinal conductor;

b. a support wrap helically wound about the conductor according to a wrap pitch and comprising first and second insulator filaments helically twisted together according to a twist pitch, wherein the filaments each have a diameter of 0.0025" to 0.010" and a tolerance of ± 0.00025 ";

c. an insulator sheath at least partially covering the support wrap and the conductor, wherein: the insulator sheath has an inner diameter of 0.020" to 0.075" and an inner diameter tolerance of ± 0.0005 "; the insulator sheath has a wall thickness, and a wall thickness tolerance of ± 0.00025 "; and the insulator sheath is supported by the support wrap at a particular number of support locations and is thereby offset from the conductor to form an airspace between the conductor and the insulator sheath;

d. a concentric ground shield disposed about an outer periphery of the insulator sheath; and

e. a concentric outer insulator jacket disposed about an outer periphery of the concentric ground shield.

8. The cable of Claim 7 wherein the cable has a characteristic impedance of 100 ohms ± 5 ohms.

9. The cable of Claim 7 wherein the insulator sheath wall thickness is 0.005" ± 0.00025 " and the conductor has a diameter of 0.008" to 0.0253".

10. A method of manufacturing a high-speed, ultra-small coaxial cable with a characteristic impedance of 50 ± 1 ohms, said method comprising the steps of:

a. preparing a support wrap by helically twisting together first and second insulator filaments according to a twist pitch, wherein the filaments each have a diameter of 0.0025" to 0.010" and a tolerance of ± 0.00025 ";

- b. helically winding the support wrap around a longitudinal conductor according to a wrap pitch, wherein the conductor has a diameter of 0.008" to 0.0253";
- c. at least partially covering the support wrap and the conductor with an insulator sheath, wherein: the insulator sheath has an inner diameter of 0.020" to 0.075" and an inner diameter tolerance of ± 0.0005 "; the insulator sheath has a wall thickness, and a wall thickness tolerance of ± 0.00025 "; and the insulator sheath is supported by the support wrap at a particular number of support locations and is thereby offset from the conductor to form an airspace between the conductor and the insulator sheath;
- d. disposing a concentric ground shield about an outer periphery of the insulator sheath; and
- e. disposing a concentric outer insulator jacket about an outer periphery of the concentric ground shield.